myki Project

Modern public transport ticketing systems are much more than simply fare collection tools. They provide the key interface with customers and, with smartcard technology, can assist strategic planning for the public transport system, through the collection of valuable usage data. A well designed and implemented system should be easy for commuters to use, and benefit transport operators by streamlining fare collection and providing access to important data on travel behaviour.

Smartcard systems are the new standard in transport ticketing internationally due to their convenience and efficiency. Tickets can be purchased and 'topped up' using automated processes, they allow rapid movement through stations and easy interchange between different travel modes. However, international experience has also shown that developing reliable and effective public transport ticketing systems is both difficult and expensive.

Background of the project

The Victorian Government's 2002 Linking Victoria Policy committed to developing a new smartcard46 ticketing system to replace the existing Metcard ticketing system when the Metcard contract (former system) expired in 2007.

The Transport Ticketing Authority (TTA) was established in April 2003 to manage the replacement of Metcard system and implement the new ticketing system. TTA would be responsible for the procurement and rollout of the new ticketing system. It completed a business case on 27 April 2004, which forecast total expenditure of $800 million over the life of the project (2004-17).

In July 2005, a vendor was appointed to develop the new ticketing system, which became known as 'myki'. Under the terms of the original contract, myki was to be fully operational by July 2007. The initial whole-of-project budget was $1 billion and included $180 million for delivering myki and $350 million for operating it for 10 years. The remaining budget included funds for operating the Metcard system in parallel with myki during the transition, and related operating costs for the Transport Ticketing Authority (TTA). TTA was abolished in 2013, following the establishment of Public Transport Victoria (PTV) which has since assumed responsibility for all of TTA's functions. For the remaining of this case study, TTA will be used to consider the agency managing the project. In April 2008, the budget was increased to $1.4 billion.

The philosophy of the myki project was to use proven software yet it pursued an 'open architecture'[1] solution which had not been undertaken in the ticketing environment in the past. myki involves over 20,000 physical devices including vending machines, readers, driver consoles

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[1] 'Open architecture' enables each element of the system (for example the card or vending machines) to be replaced by a different brand of product which will operate in and integrate with the other elements of the system. Meaning it allows the flexibility of adding, upgrading and swapping components over time without limiting the state to using a single vendor.

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and back-office hardware deployed over a wide area and covering different modes of transport – metropolitan and regional bus lines, regional and metropolitan rail lines and metropolitan trams. The vendor included 17 sub-contractors in its consortium. By any measure, the system is a complex one.

myki System

The myki system includes the following components:

- myki smartcard—used to pay for travel on public transport. The myki smartcard technology enables a money value—myki money—and/or a travel pass—myki pass—to be stored on the card. Public transport users that 'top up' with myki money need to touch on and off for each trip so that the myki system can automatically calculate and deduct the lowest fare for the travel taken.
- Devices—the system currently has around 23 500 operational devices. These include card vending and top-up machines, fare payment devices, bus and tram driver consoles, station gates and hand-held devices. These devices read and translate information stored on smartcards and transmit information to and from the back office.
- The back office and related systems—these support the operation of the myki system.

It was expected that myki would deliver a range of benefits for users, transport operators and the state including:

- ease of use
- convenient purchase and payment options
- efficient operations in terms of boarding
- high-quality information for transport planning
- increased flexibility to change and drive user patterns through differential pricing and fare structures.

Despite their clear benefits for commuters and transport system operators, smartcard ticketing systems are challenging to design and implement due to: the complexity involved in designing and delivering a solution that meets the needs of a unique transport system, such as Victoria's, with multiple modes and zones of travel; and, the need to properly inform and assist commuters as they adapt to the new system.

The myki system covers:

- 15 train lines with 208 stations in metropolitan Melbourne
- 24 tram routes with 500 trams in metropolitan Melbourne
- 346 bus routes with 1 753 buses in metropolitan Melbourne
- 5 regional train lines with 51 stations

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- 127 regional bus routes.

The myki system also offers a complex range of ticketing fares, with both zoned and time-based charging and a variety of concessions and discounts. The system executes 150 business rules each time a card is scanned, which constitutes around 1.07 million fare transaction-type permutations, making it one of the most complex smartcard ticketing solutions in the world.
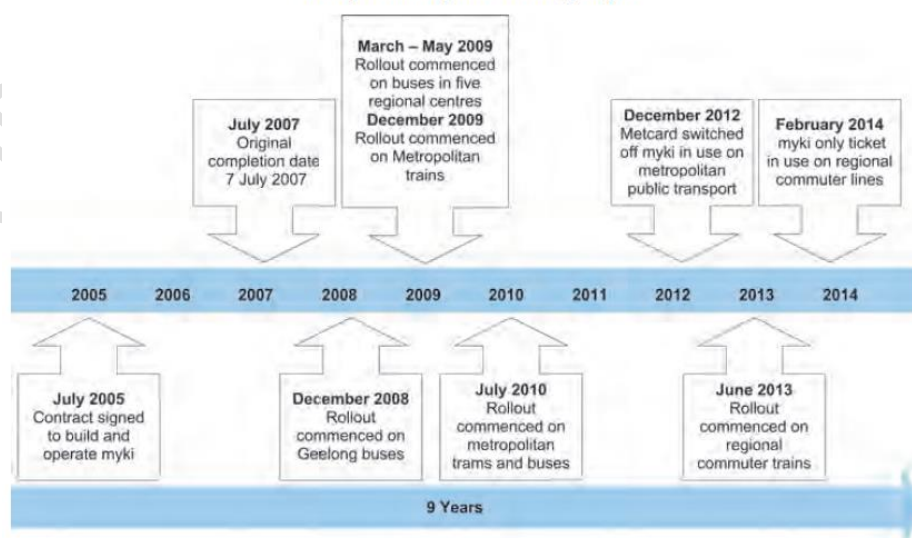
The optimistic bias and timeframe

The myki business case indicated the project would be delivered within two years – this was when the contract for the existing ticketing system expired. No other project of this type and similar complexity had been completed successfully in less than four or five years. Yet the business case for myki was adamant that a two-year delivery was achievable. Unsurprisingly, the two-year timeline was not achieved and an increase in the delivery time for the project had a significant impact upon project costs.

Optimism bias has also had a human impact. It affected the morale of staff working on the projects, who had to deal with the perception that they had failed – although some expectations were clearly unrealistic. It resulted in a need for project managers and sponsors to raise more funding for the project and to deal with media 'fires' caused by the political concerns of the project going over budget or being delayed – instead of focusing on delivering or driving the project. In the case of myki, optimism bias in relation to delivery timelines contributed to the public's poor perception of the project and its continuing unwillingness to use the new ticketing system, creating more pressures to the delivery of the project.

The myki system was due to be operational by July 2007. However, there have been multiple delays, scope changes and cost increases.

Source: Victorian Auditor-General's Office.

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The total time of the design and delivery phase has more than quadrupled from the original expectation of two years, to in excess of nine years. This is more consistent with smartcard projects in other cities, where it usually takes five or more years.

The view of one witness from the vendor was that 'had a realistic timeframe for the project been set [no other project of this type been produced in less than five years], had the TTA not become so operationally focused and had the original scope not been so altered with subsequent specifications from the TTA, then we would not be sitting here discussing cost and delivery overruns'.

The procurement process and conflict of interests

The approach used for tendering the project was the "interactive tendering approach" or "competitive dialogue". In essence, this approach requires the agency and tendering vendors to work closely together during the tender period for both parties to gain a better understanding and appreciation of what is required and what the vendor can offer. This entails ongoing dialogue and exchange of views and information between the parties so that once the tender process is complete there is a very clear understanding of what is required and what will be provided.

Generally, contractors previously engaged by an agency (where they may have had some insight into the tender processes and/or procurement strategy) should not be allowed to bid for the project. However, on occasions such contractors do bid for the relevant projects. In such cases, it is important for probity practitioners and agencies to consider the impact on the project of the perception of a conflict of interest.

In myki, the winning bidder had been engaged by the Transport Ticketing Authority prior to the tender process to assist with the design philosophy for the project. There were numerous examples of TTA individuals having had a working relationship with individuals in one or more of the tendering entities. The smart card ticketing development industry is a small one worldwide and previous working relationships between individuals were reported as being inevitable. These issues raised concerns (perceived or real) about the probity of the project. The Transport and Ticketing Authority engaged a probity auditor at the time, but he still provided probity advice, which could still be considered a conflict in itself as this may lead to situations where the probity auditor is auditing his own advice. These issues were handled to the probity auditor's satisfaction and, still, the vendor's eligibility to be accepted as a tenderer was the subject of some considerable debate within the TTA which had not foreseen that they would be a bidder, remaining a perception that they may have had an advantage in the tender process.

Additionally, the myki approach of tendering of "interactive vendor engagement" proved successful in establishing a consortium of preferred vendors but besides the probity concerns, specification issues were not well understood. In the initial evaluation of the six tenderers, only

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the successful bidder was unable to evidence a proven solution: all others nominated sites where their solutions were in place.

The 'open architecture' solution required by the TTA was new to the ticketing environment. Generally, other smart card ticketing systems in the world were proprietary systems. The open architecture solution, which was being considered within DOT prior to the establishment of the TTA, was to ensure that government was not committed to any one vendor and was able to benefit from technical advances in any aspect of the system. While there are obvious benefits for government in this approach, it was concerning that TTA elected to spend considerable public funds contracting an unproven vendor to deliver a significant product in an unproven operating environment. This decision entailed a higher level of risk and was a contributing factor to the delays. In this regard, a witness stated that the vendor was 'learning as they were going, which was problematic'.

Complex requirements

The request for tender (RFT) documentation was extensive, comprising four volumes of information. The tender process was an interactive and complex one involving significant ongoing negotiations where tenderers were encouraged and requested to work with different sub-contractors (sometimes from rival bids) to achieve what was regarded the best outcome for government in terms of price, delivery and deliverables.

The agreement (contract) and associated contractual documents included:

- over 13,000 pages
- over 40 schedules
- four exhibits made up of more than 370 separate documents
- over 3,000 outcomes.

In addition, the vendor stated that the TTA required in excess of 350 specification changes during the development process. In December 2010, the vendor stated that 'the TTA has continued to develop new requirements which have added complexity, cost and time to the project'. In response to my draft report, the Chief Executive Officer, TTA stated 'the Requirements Specification phase provided additional clarity around many requirements, as had been foreshadowed in the contract award process, but it did not change requirements (with the exception of a few matters which were dealt with as contract variations)'.

Additionally, the outcomes-based contract[2] which included all documentation exchanged between the TTA and the vendor during the tender process was problematic. Its lack of specificity

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[2] An 'outcomes-based' agreement only defines the overall objectives of the project: it does not include detailed specifications. For example, one outcome was 'a damaged or defective Smartcard may be replaced'. It does not define what is defective or damaged, or how it is to be replaced.

and misunderstandings of what document took precedence over others in the contractual documentation led to uncertainties and ambiguities whether some functional requirements were within or outside contractual arrangements, leading to disputes about costs and priorities.

This demonstrated a reluctance of the agency to make the most of the commercial off-the-shelf system solution. Instead, the requirement of the project was to fit and embrace all the business rules associated with the metcard system, for example – multiple zones and fares. This caused myki to be delayed during both the specification and development phases as the contractor tried to come to grips with the complexities that the business rules created and the excess of complexities added to the project.

This approach inevitably led to increased project costs and can still fail to capitalise on the advancements in technology since the old system was developed. An over-emphasis on replication of existing processes can result in lost opportunities in terms of making changes to improve processes, making the most of what the system itself has to offer, which could impact on the expected benefits from the new system.

Project's Relationships and Governance

The TTA board is responsible and directly accountable to the Minister and Treasurer for delivering myki. There was, however, no evidence that the board was held accountable for the failure of the TTA to meet the system deliverables. There was also the concern that the board had enough members with the requisite skills and experience over the course of the project. The initial board did not include an appointee who had previously managed the development and implementation of such a significant ICT-enabled system or had a detailed knowledge of the transport ticketing environment. It was not until the project failed to meet its two-year delivery deadline that a member with strong ICT experience was investigation into ICT-enabled projects was appointed. Until then, all the available knowledge and skills would appear to reside with the CEO and his staff. In these circumstances, it would be difficult for a board member without any relevant experience to question details of the project.

The myki board had regulated responsibility to deliver the myki system yet it did not have the authority to agree to or expedite policy changes. This impacted on project delivery. The steering committee must not only have relevant experience, it must challenge the project manager about failure to meet milestones and ask the hard questions in order to drive the project to success. In this regard, the initial myki board lacked the experience to challenge the Transport Ticketing Authority (TTA) about the project.

The Department of Transport (DOT) had policy responsibility for ticketing issues and as such the TTA was reliant on DOT responding quickly and effectively to requests for policy changes. A

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representative of Department of Treasury and Finance (DTF) had observer status at board meetings but had no responsibility for the project or to report back to DTF.

The relationship between the TTA and the vendor was a fractured one, based on mistrust and misgivings. In its December 2010 review of myki, DOT stated that 'the project continues to be affected by ongoing technical difficulties, changing specifications and management/relationship issues between [the vendor], its sub-contractors and the TTA'. The vendor commented that 'in the early stages of the Project, the TTA's approach was proactive and confident... When public perception of the Project waned, the TTA withdrew from sufficient engagement'.

This was also the result of the primary contractor being overseas based with local representation in Australia and Victoria. While this project was large by Victorian terms, it was not necessarily so for the vendor. In these circumstances, the size of the project and access to the vendor's executive have limited the influence the government can exert to expedite project deliverables. In the myki case, the TTA spoke on numerous occasions to the vendor's executive in the United States with limited success: this was exacerbated by the sale of the US parent company twice during the contract period and liquidity problems for the local company.

Another aspect of vendor management that the agency has identified as problematic in the myki project was in making sure that vendors retain adequately skilled staff. The project experienced problems with the quality of the project staff provided by the US-based vendor. Nonetheless, during the project, the agency's secretary and chief executive officer regularly engaged with the vendor to intervene and try and solve these issues. At one stage, the TTA had asked the vendor to demonstrate its ongoing commitment to the project on more than one occasion and the senior executive of the vendor was replaced to respond to these demands. The TTA board meeting minutes recorded the board's concern and frustration that deliverables and milestones had not been met. On at least one occasion it considered the ramifications of embarking on legal action for what it saw as the failure by the vendor to meet its contractual obligations.

From another perspective, a witness from the vendor expressed the view that the TTA 'kept changing the goalposts' and also stated that the TTA was adversarial rather than conciliatory in its dealings with them, being very operationally focused and intruding into their dealings with its sub-contractors.

In a briefing paper to the Secretary, DOT in 2010, the vendor stated that 'the State's and TTA's key personnel have changed several times, three Ministers for transport and five CEOs'. The TTA was also highly critical of the quality of the project managers employed by the vendor. Without high quality project management staff and their continuity of employment, the risks of project overruns significantly increased.

Costs and Contingency funding

By November 2011, costs have increased by at least 40 per cent since the award of the contract - from $1 billion to $1.4 billion - and it is likely that additional costs will ensue prior to project completion and total replacement of Metcard. The TTA business case dated 27 April 2004 had forecast total expenditure of $800 million over the life of the project (2004-17). Following the award of the contract in 2005, the budget was revised to $1 billion, consisting of:

- project cost (including 10 years operation) - $752 million
- cost to retain Metcard - $41 million
- TTA operations - $207 million.

In April 2008, the budget was increased to $1.4 billion, consisting of:

- project cost (including 10 years operation to 2019) - $930 million
- cost to retain Metcard - $210 million
- TTA operations - $260 million.

As the above figures show, by 2011, some $169 million or 42 per cent of the increase can be attributed to keeping the Metcard arrangement in place over the extended implementation period. The budget might still need to increase to cover anticipated additional expenditure resulting from current negotiations between the vendor and the TTA to revise the contract to account for further scope variations; and from the extended reliance on Metcard for parallel services.

At 30 June 2014, the revised capital and operating budget for myki until 2016 was $1.6 billion, an increase of 60 per cent on the initial budget of $1 billion. Significant additional costs of approximately $200 million, over the budgeted amount of $106.8 million, were incurred for operating the Metcard system in parallel with myki beyond its contracted termination date in 2007.

The cost of consultants engaged by the TTA to assist with the project also totaled more than $37 million. This is a considerable sum that could be looked at with hindsight to reduce costs. For example, more than $8 million was expended on legal advice and services.

Contingency funding is another item within the project budget where there was no consistent understanding or use of funds. Generally speaking, an amount is included in the project budget to cater for unexpected, future events which are likely to impact on the cost of the project – contingency amount. The contingency should provide a buffer for the project and also act as an early warning signal to the agency executive, DTF and the Cabinet budget committee that the project is potentially going off-track.

A DTF official considered that access to contingency funding should be closely monitored as using it indicates that the project is moving outside its budget. In the myki project, a witness stated that

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available contingency funding was misused to pay for equipment to be installed on the public transport system, including new rolling stock and at stations/stops, depleting the contingency fund on items outside of the Transport Ticketing Authority's control.

The project management methodology

In its Business Plan (April 2004), the TTA stated it believed 'that the timeframes as set out are aggressive but achievable as they are based on a number of deliberate strategies'. One of these strategies was to recruit experienced staff to the TTA. Another strategy was to use the 'agile' software development methodology to expedite the development process. This approach can shorten delivery times and reduce risk by breaking large complex projects into smaller discrete projects that can be developed in parallel. This approach was chosen for myki to help meet the short-planned timeframes, but this approach was not appropriate for such a complex project with such a significant number of inter-related systems and a large number of subcontractors.

This strategy was unsuccessful in reducing project timeframes and as one witness stated: 'The agile methodology was never going to work in an environment where development was being undertaken across many countries by numerous developers.

In terms of meeting the planned milestones and delivering the system efficiently and effectively this approach failed, indicating that a better knowledge of and understanding of various approaches to managing projects and developing software was required by the management team to choose the appropriate methodology based on its merits.

Given the significant delay, additional costs and challenges in delivering myki, the former government commissioned a review of the system in late 2010 to determine its future in a modified form.

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